Upland disturbance and storm events: effects on stream nutrients, organic material, and suspended sediments

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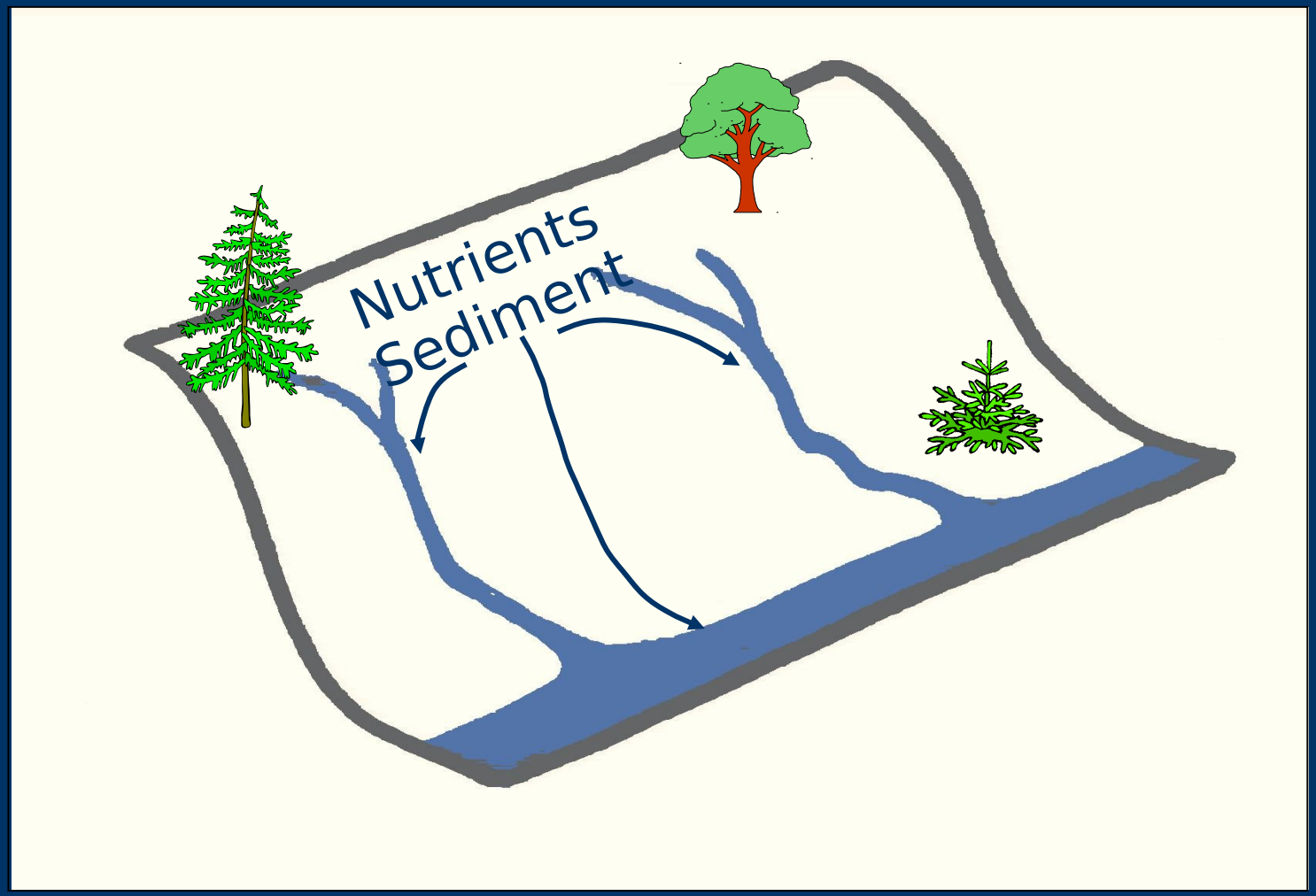
Project Goals

1. Determine the impacts of disturbance from military activities
   on riparian and stream ecosystems
2. Evaluate the effects of stream restoration

Catchment characteristics affect nutrient and sediment inputs



http://www.pep-c.org/floods/

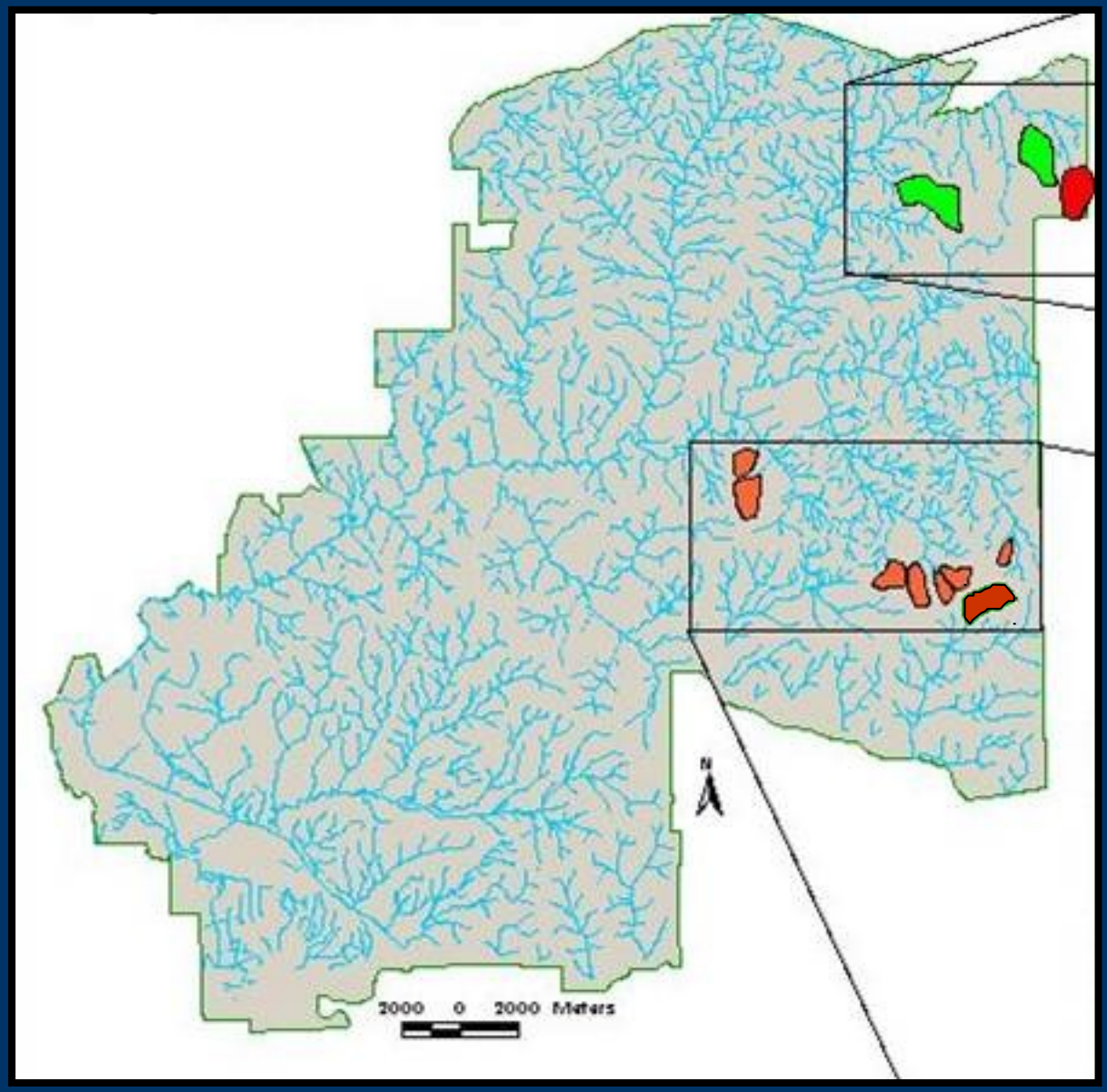
Central Question

What effects do upland soil and vegetation disturbances have on stream structure and function?

- Storm chemistry
- Base flow chemistry
- Benthic organic matter
- Stream metabolism

Catchment disturbance at Ft. Benning, Georgia

Ft. Benning stream sites

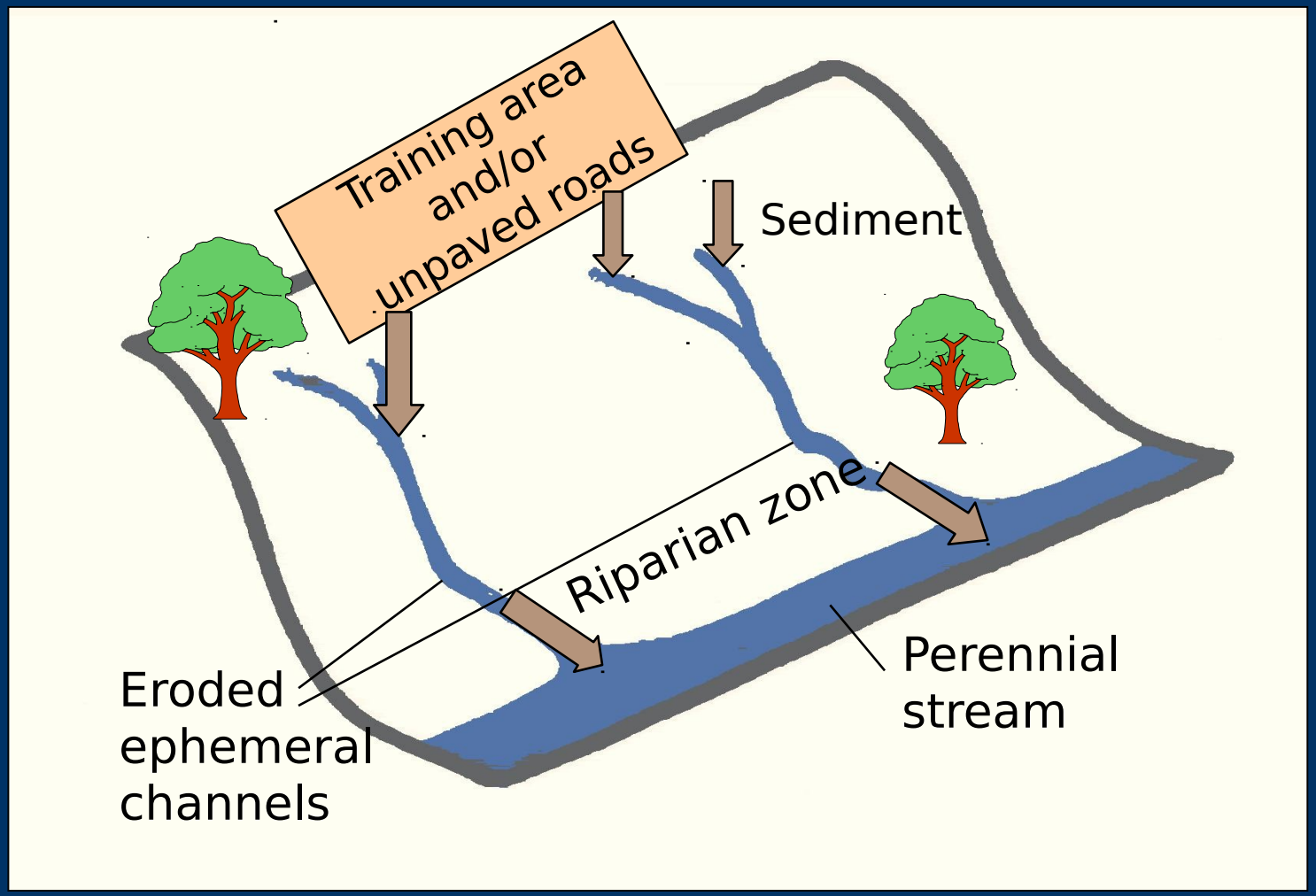


Ft. Benning contains a wide range of disturbance conditions

High disturbance:
Unpaved roads and training areas

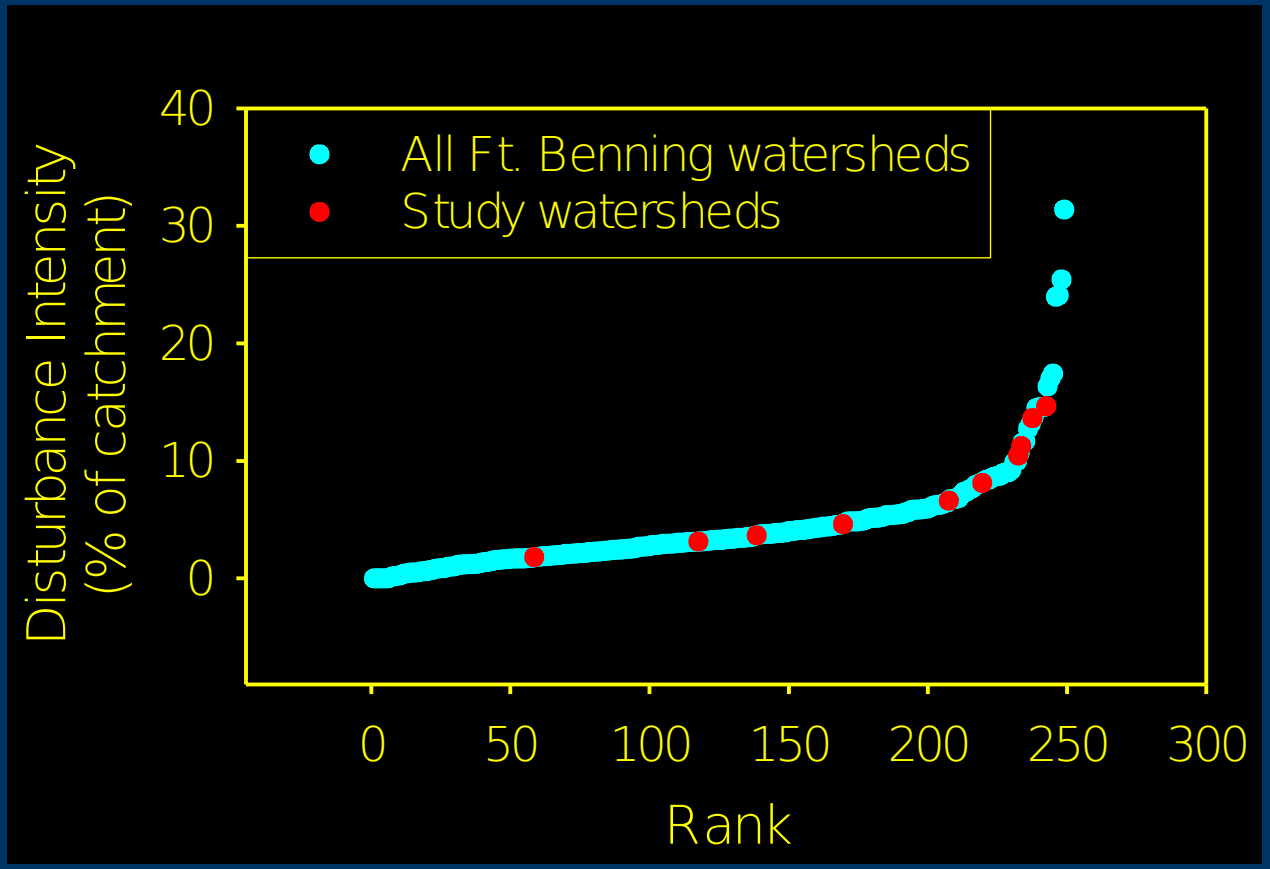
Low-Moderate disturbance
Ordnance impact areas

Expected effects of upland disturbance



Eroded ephemeral channel

Disturbance Intensity



Disturbance intensity is the sum of:

1) % Bare ground on slope > 3%*
2) % Road coverage*

*K. Maloney, Auburn U.

Storm Chemistry

http://www.datacraftuk.co.uk/fun/signs/signs.htm

<u>Variables</u>:

Inorganic suspended sediments (ISS)

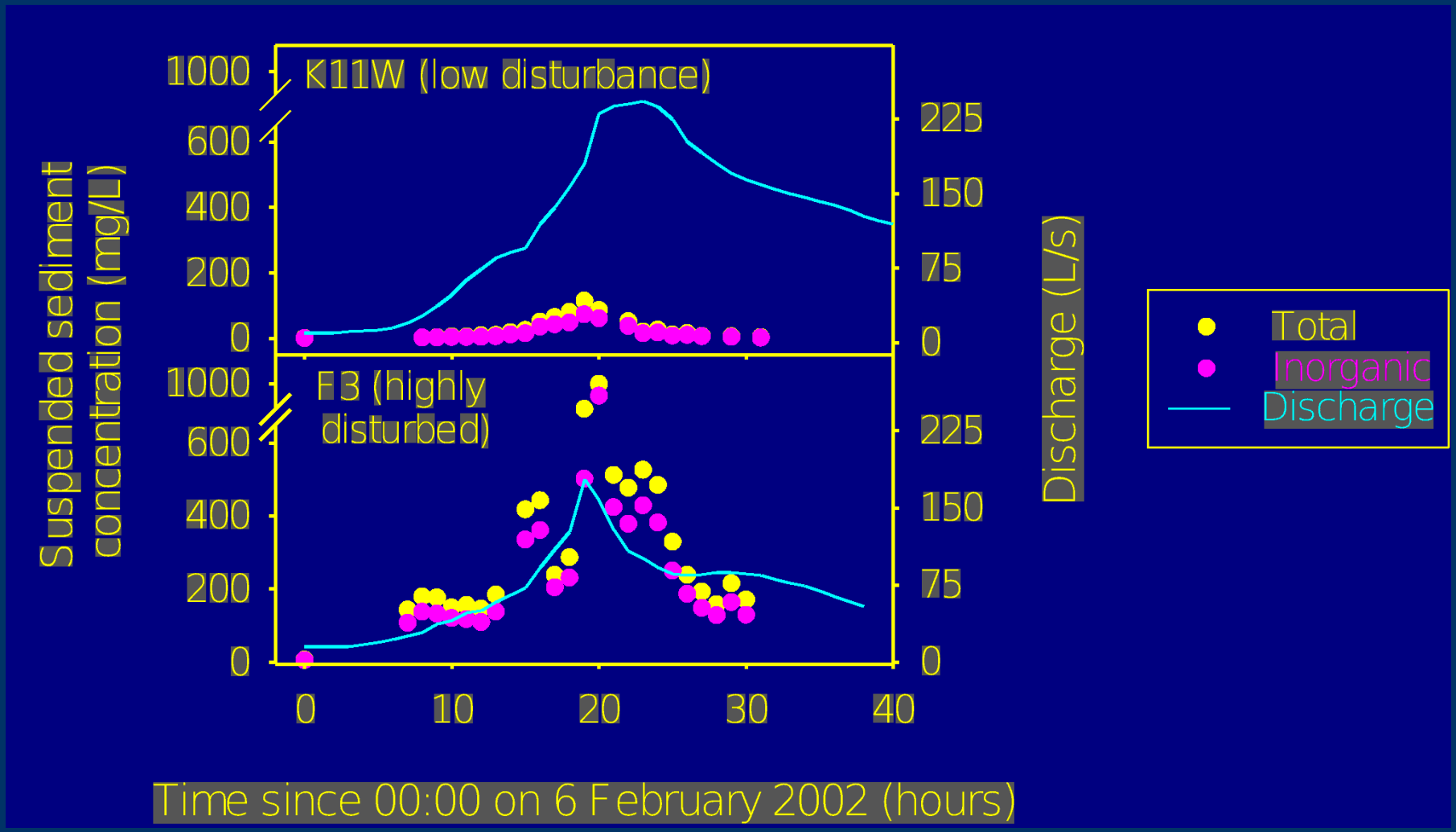
SRP

NH_4

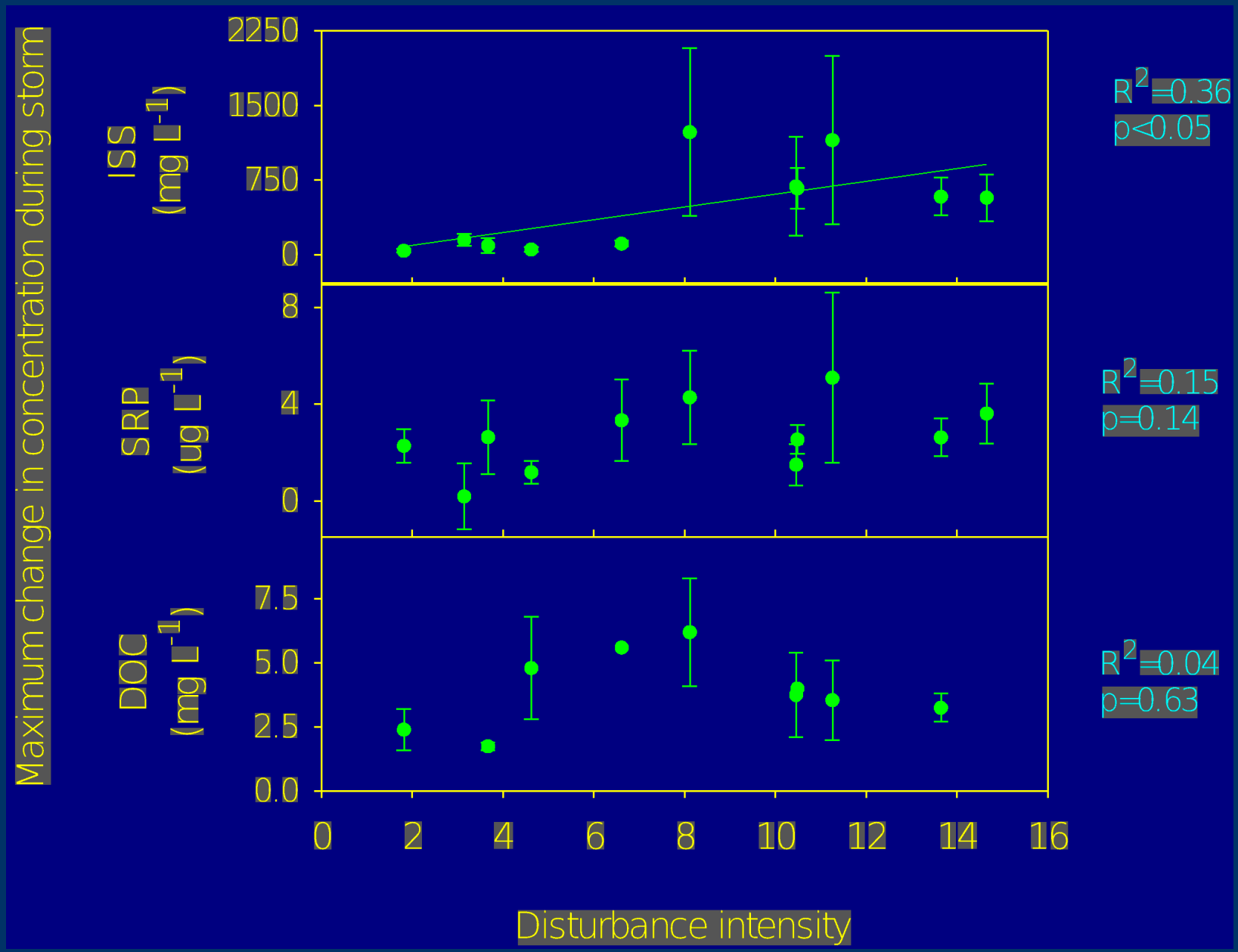
NO_3

DOC

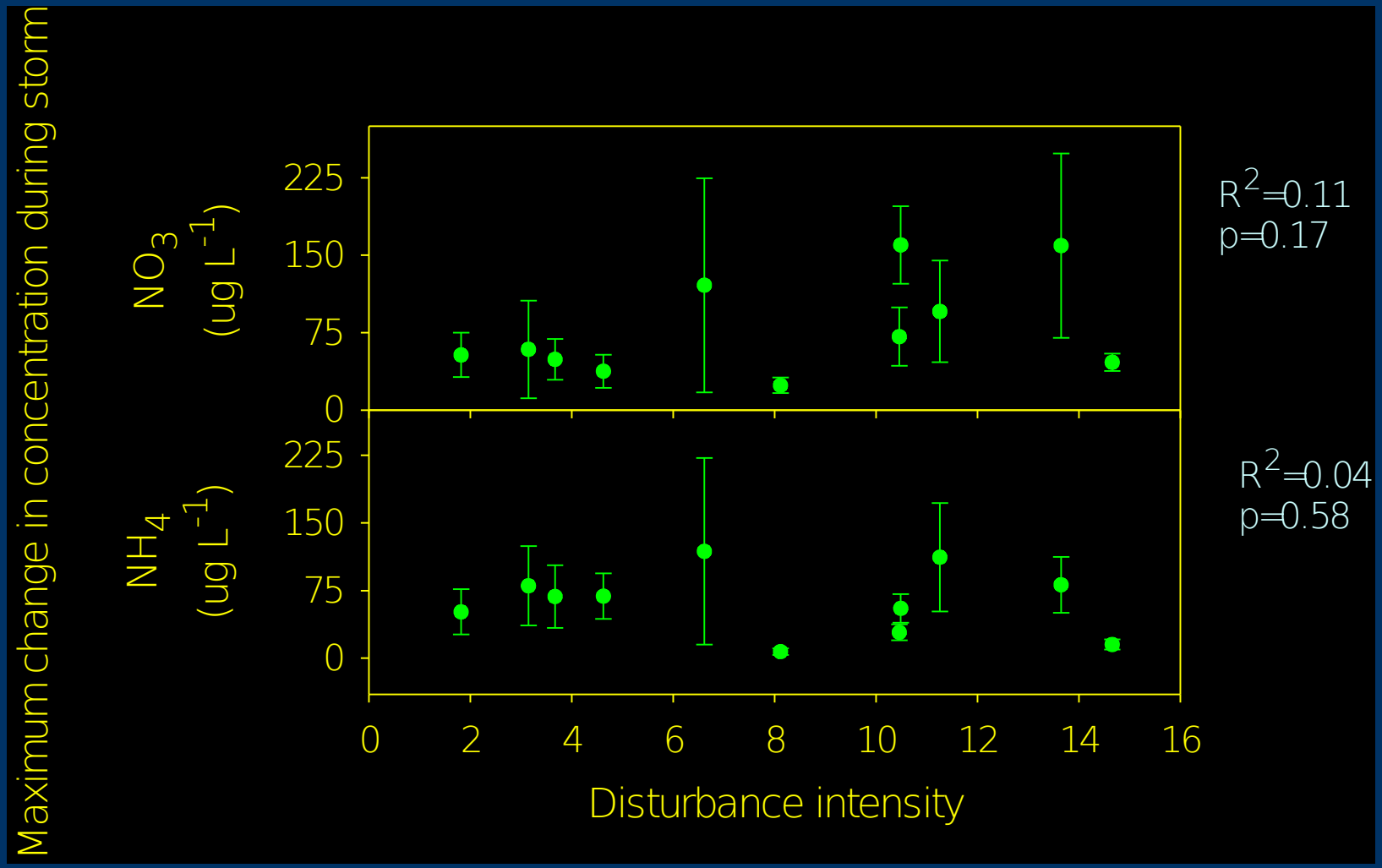
Storm hydrograph and suspended sediment concentrations in a low and high disturbance stream



Maximum change in concentration during storm

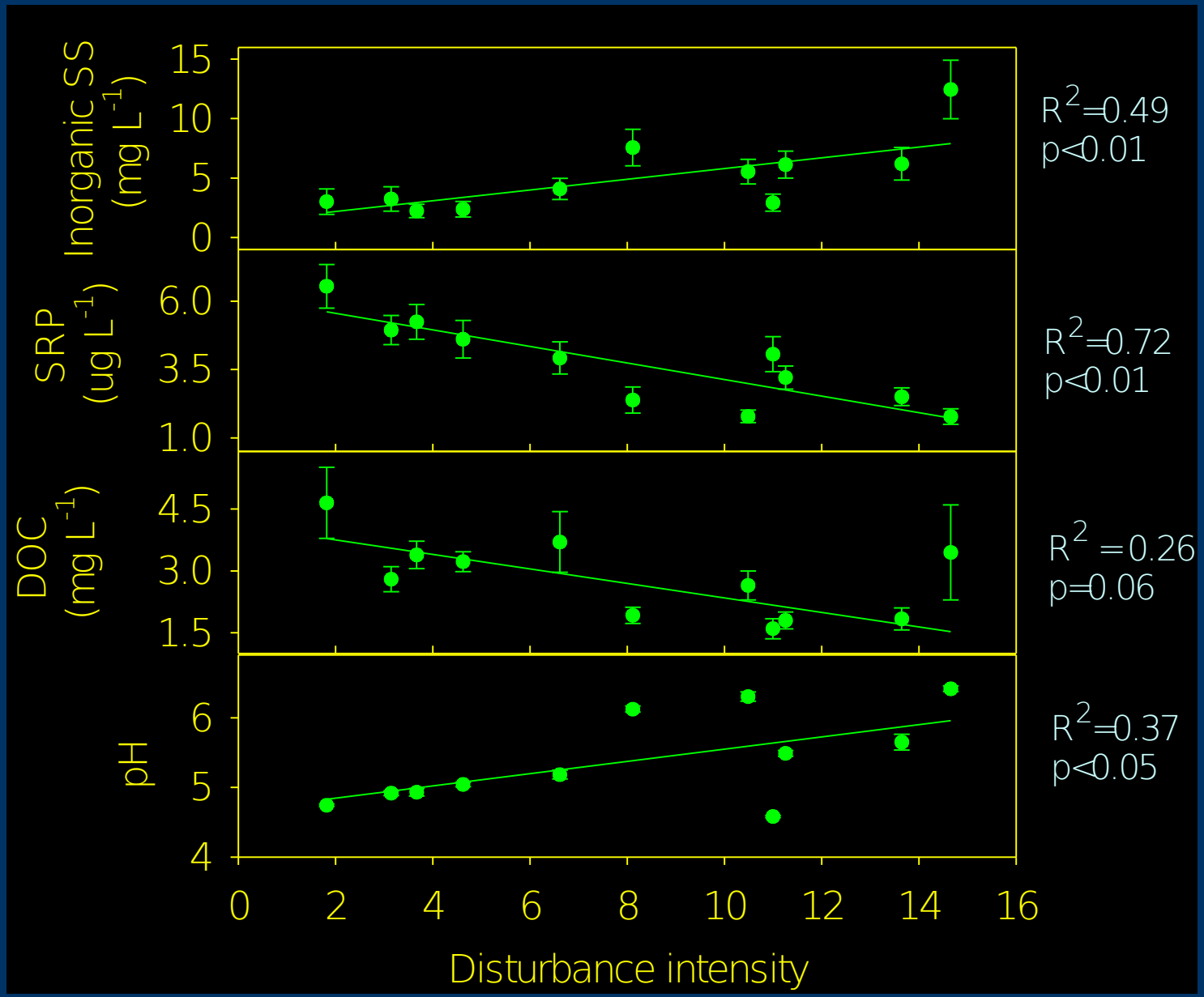


Maximum change in concentration during storm

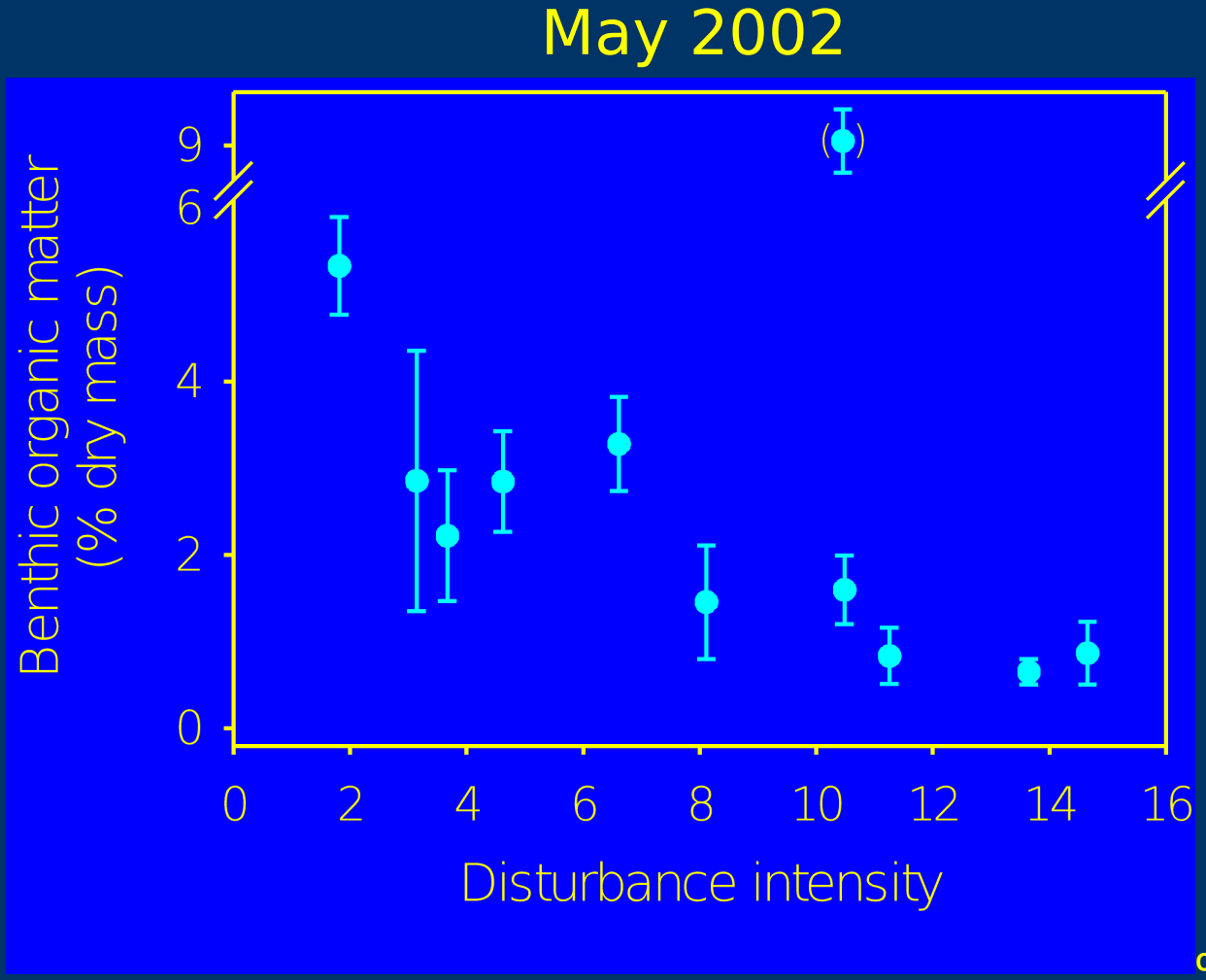


Baseflow chemistry

Baseflow stream chemistry

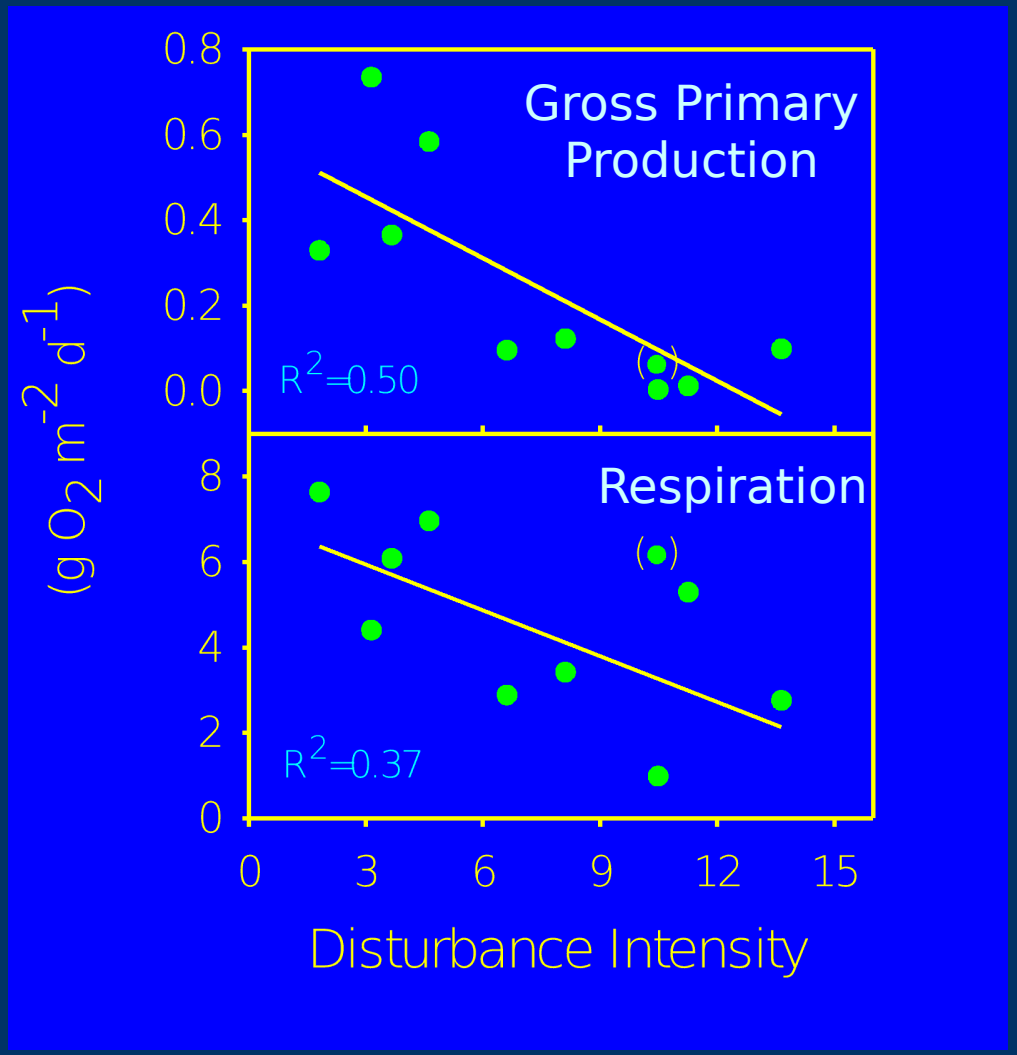


Benthic organic matter is negatively correlated with disturbance intensity



%OM data provided b
K. Maloney, Auburn U

Gross primary production and respiration are negatively correlated with upland disturbance



Summary: Effects of upland soil and vegetation disturbance

Low disturbance

High disturbance

<u>High ISS inputs</u>:

- Bury/dilute organic material (leaves, etc)
- Bury coarse woody debris and homogenizes stream channel
- Forms an unstable substrate that provides a poor environment for benthic algae and invertebrates

Summary: Effects of upland soil and vegetation disturbance

Low disturbance

High disturbance

<u>Highly disturbed streams</u>:

- Higher ISS concentrations during storms and baseflow
- Lower baseflow SRP and DOC concentrations
- Higher baseflow pH
- Lower % benthic organic material
- Lower primary production and respiration